

CLAIMS

What is claimed is:

1. A multiphase brushless electric motor comprising:
a rotor comprising a plurality of permanent magnets;
a stator comprising a plurality of windings, each winding
corresponding to a respective motor phase, the plurality of windings
5 permanently connected to each other at a plurality of junctions; and
a plurality of terminals coupled to a controlled power source;
wherein the plurality of terminals are fewer in number than the number
of motor phases, and each terminal is directly connected to a respective single
one of said junctions.
2. A multiphase brushless electric motor as recited in claim 1, wherein
the number of terminals is fewer than the number of junctions.
3. A multiphase brushless electric motor as recited in claim 1, wherein
the plurality of windings comprise:
a first group of windings connected in a delta configuration, adjacent
windings of the configuration joined at a respective one of said junctions; and
5 a second group of windings connected in a wye configuration, end
points of the wye configuration joined to respective ones of said junctions.

4. A multiphase brushless electric motor as recited in claim 3, wherein one of said junctions, which is connected to an end point of the wye configuration, is not directly connected to a terminal.

5. A multiphase brushless electric motor as recited in claim 3, wherein the motor comprises seven phases, the delta configuration comprises five of the phase windings with five junction points, the wye configuration comprises two of the phase windings, and only four of the junction points are directly
5 connected to respective terminals.

6. A multiphase brushless electric motor as recited in claim 5, further comprising a first resistance element connected across one of the phase windings of the delta configuration and a second resistance element connected between a center node of the wye configuration and one of the junctions.

7. A multiphase brushless electric motor as recited in claim 1, wherein the stator further comprises a plurality of ferromagnetic core segments ferromagnetically isolated from each other, each core segment having a respective phase winding formed thereon.

8. A multiphase brushless motor as recited in claim 7, wherein each core segment comprises a plurality of poles, each pole facing the rotor across an air gap.

9. A multiphase brushless motor as recited in claim 7, wherein the number of phases is equal to the number of stator cores and each phase winding is wound on a respective one of the stator cores.

10. A multiphase brushless electric motor system comprising:

a motor comprising a permanent magnet rotor and a stator comprising a plurality of windings, each winding corresponding to a respective motor phase, the plurality of windings permanently connected to each other at a plurality of
5 junctions;

motor energization circuitry coupling the stator windings to a source of power for supplying controlled energization current to the windings, the motor energization circuitry having a plurality of power supply output terminals fewer in number than the number of junctions; and

10 a central processor coupled to and controlling the motor energization circuitry; wherein each said power supply output terminal is directly connected to a respective single one of said junctions.

11. A multiphase brushless electric motor as recited in claim 10, wherein the plurality of windings comprise;

a first group of windings connected in a delta configuration, adjacent windings of the configuration joined at a respective one of said junctions; and

5 a second group of windings connected in a wye configuration, end points of the wye configuration joined to respective ones of said junctions.

12. A multiphase brushless electric motor as recited in claim 11,
wherein the motor comprises seven phases, the delta configuration comprises
five of the phase windings with five junction points, the wye configuration
comprises two of the phase windings, and only four of the junction points are
5 directly connected to respective terminals, whereby the seven phase motor is
controlled with four controllable power outputs.

13. A multiphase brushless electric motor as recited in claim 11,
wherein the stator further comprises a plurality of ferromagnetic core segments
ferromagnetically isolated from each other, each core segment having a
respective phase winding formed thereon.

14. A multiphase brushless electric motor as recited in claim 11,
wherein said motor energization circuitry comprises a set of controlled
switches connected to each power supply output terminal.

15. A multiphase brushless electric motor as recited in claim 11,
further comprising monitoring means for monitoring the current in each of the
plurality of stator phase windings, the monitoring means coupled to the central
processor to provide current feedback signals thereto.

16. A multiphase brushless electric motor as recited in claim 12,
further comprising a current monitor connected to each of the energization

circuitry power supply output terminals and coupled to the central processor to provide current feedback signals thereto.

15. A multiphase brushless electric motor as recited in claim 11, further comprising a current monitor connected in series with the battery coupled to the central processor to provide current feedback signals thereto.